

A Framework for the Total Value Proposition of Clean Energy Technologies

Presented by
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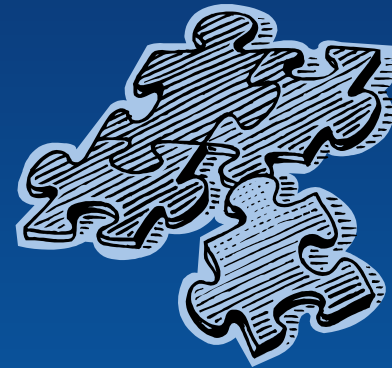
Conventional Valuation



Revenue enhancement
Cost reduction
+ Brand Value



Value



Making headlines

“Toyota Scrambling to Produce Hybrids to Meet Growing Demand” - *AP*

“CO2 Reduction Efforts Save BP \$650 Million” - *Reuters*

“Being Eco-friendly Can Pay Economically: ‘Green Marketing’ Sees Growth in Sales, Ads” - *USA Today*

“GE Doubles Research on Clean Technology” - *The Guardian* (London)

“Swiss Re to Become Fully Greenhouse Neutral” - *Swiss Re*

Proposed Valuation Framework



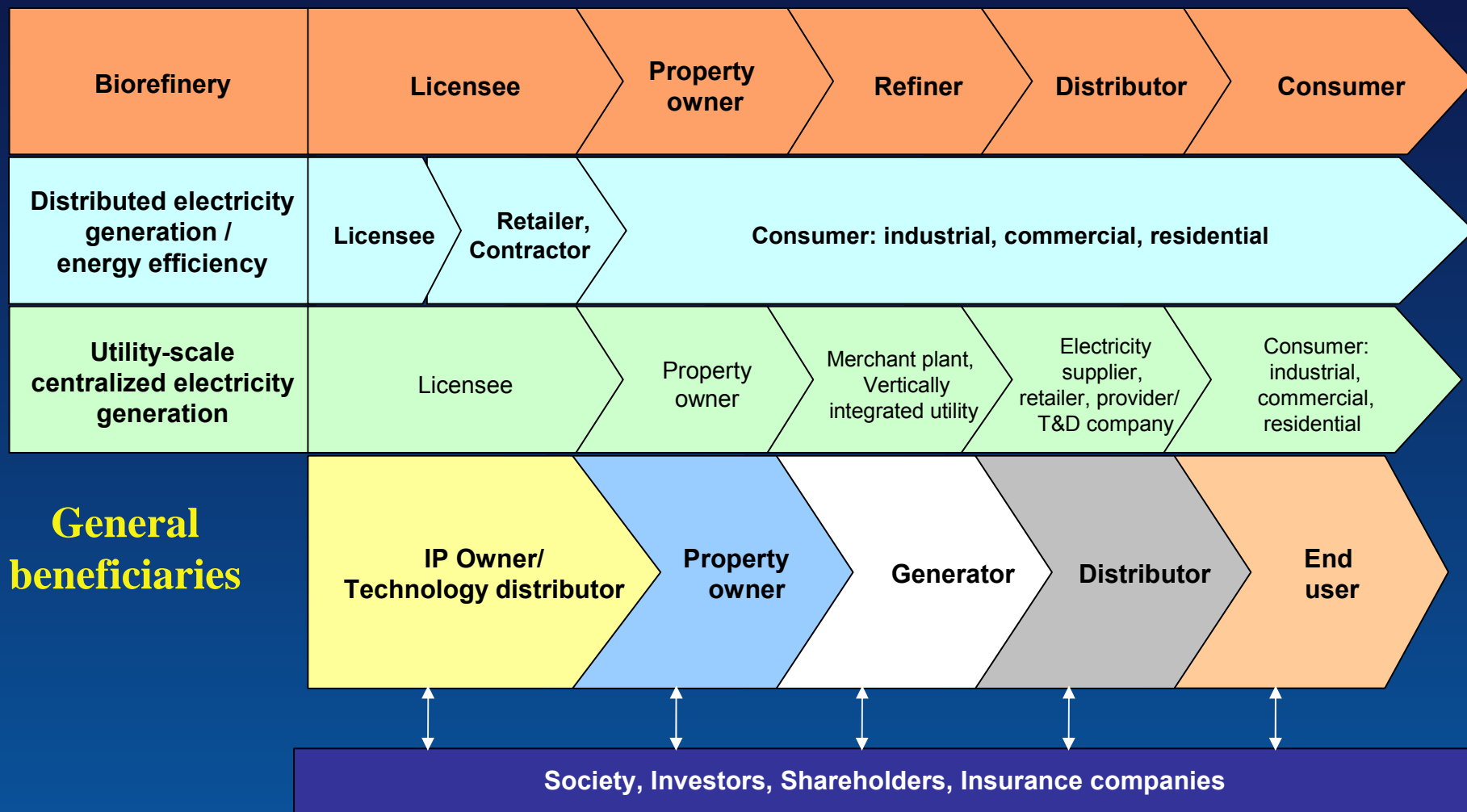
Overview

- Key concepts
- Values examined
- Beneficiaries
- Next steps and impending challenges

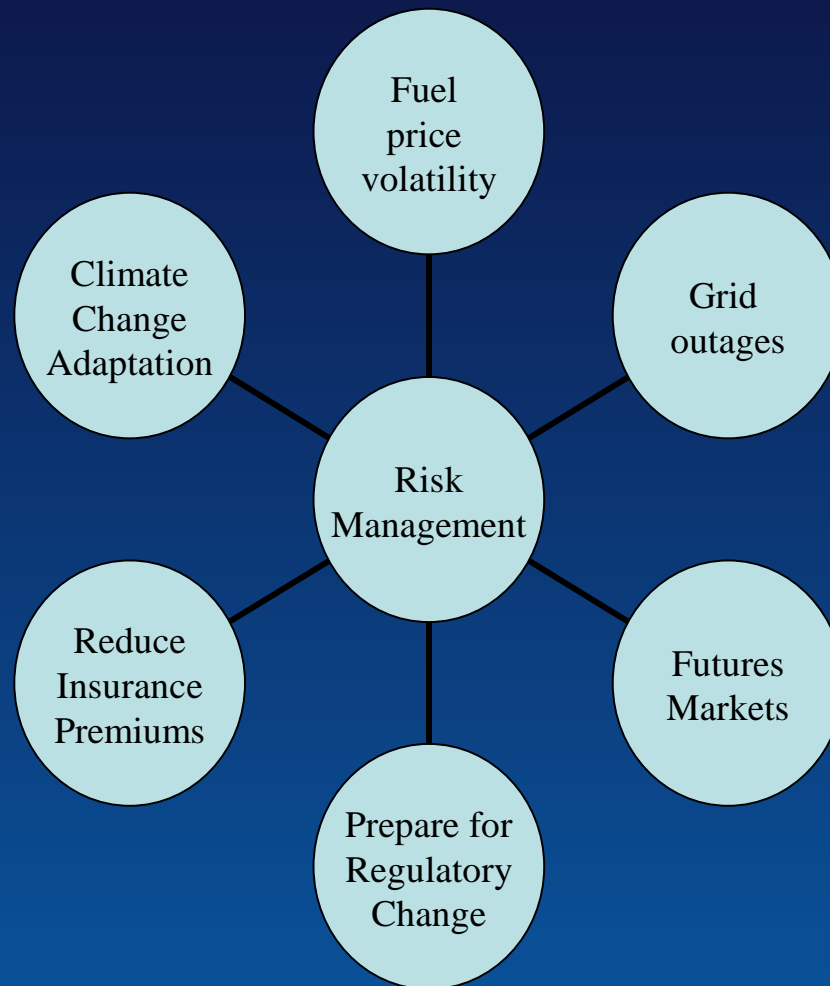
Key Concepts: Power Technology

	Clean		Conventional
Power	Solar (PV) Solar thermal Wind Geothermal Biomass CHP	Landfill methane Operational efficiency Building efficiency Wave Tidal	Coal Natural Gas Nuclear Microturbines Reciprocating engines Small gas turbines
Fuels	Biofuels: bioethanol, methanol, biodiesel Hydrogen fuel cells Hybrid technologies		Oil Gasoline Diesel Natural Gas Propane

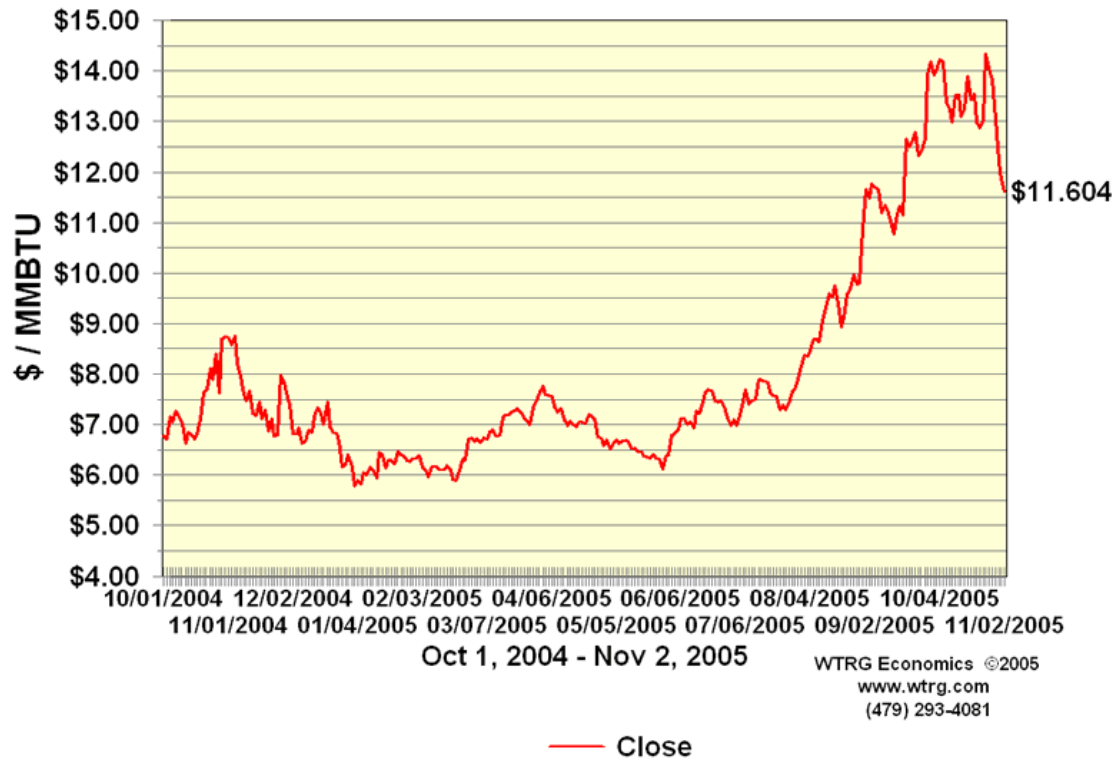
Key Concepts: Value Accumulation



Value Category: Risk Management



NYMEX Natural Gas Futures Close (Front Month)



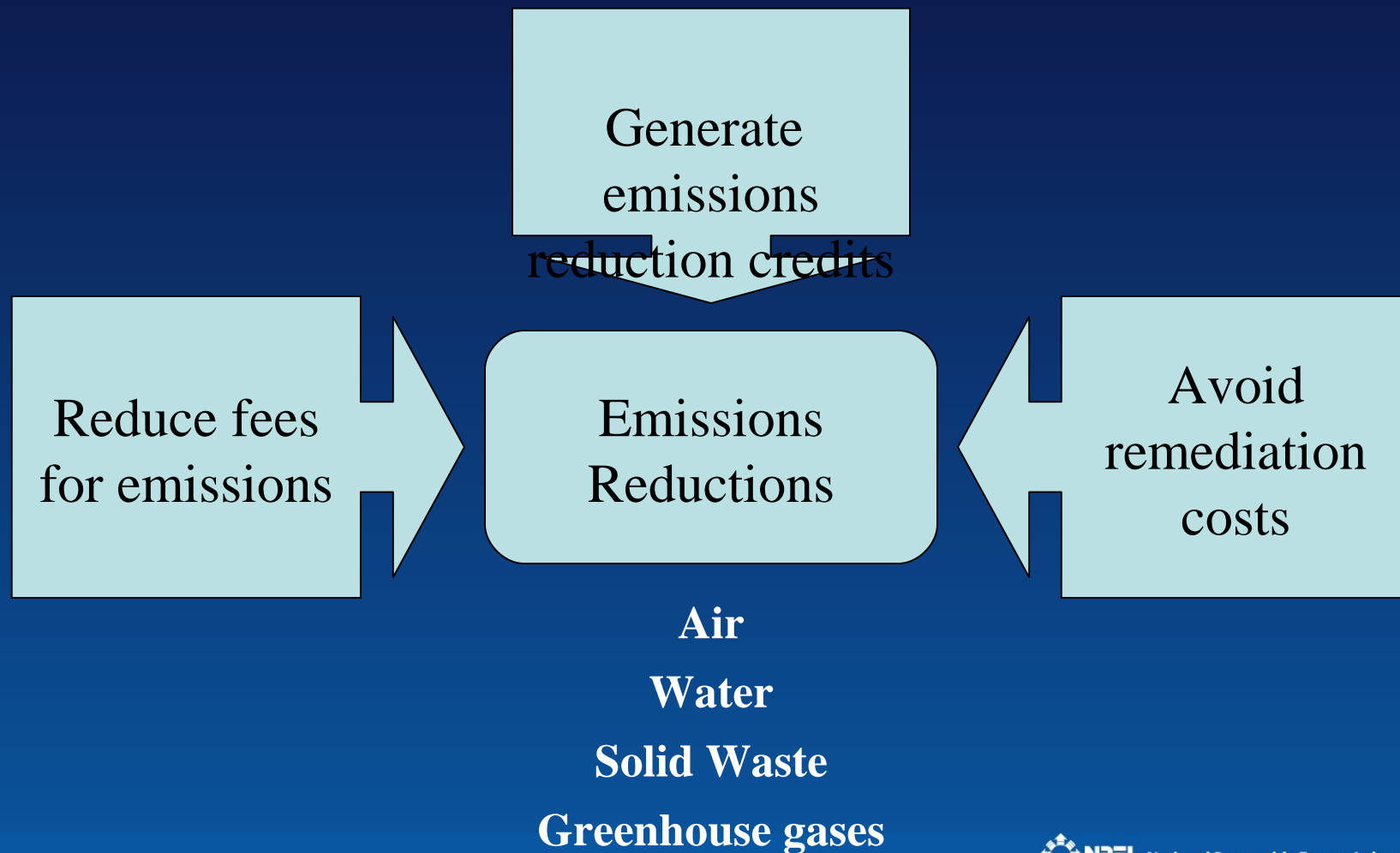
Source: <http://www.wtrg.com/daily/ngfclose.gif>

Cost of power outages for selected commercial customers

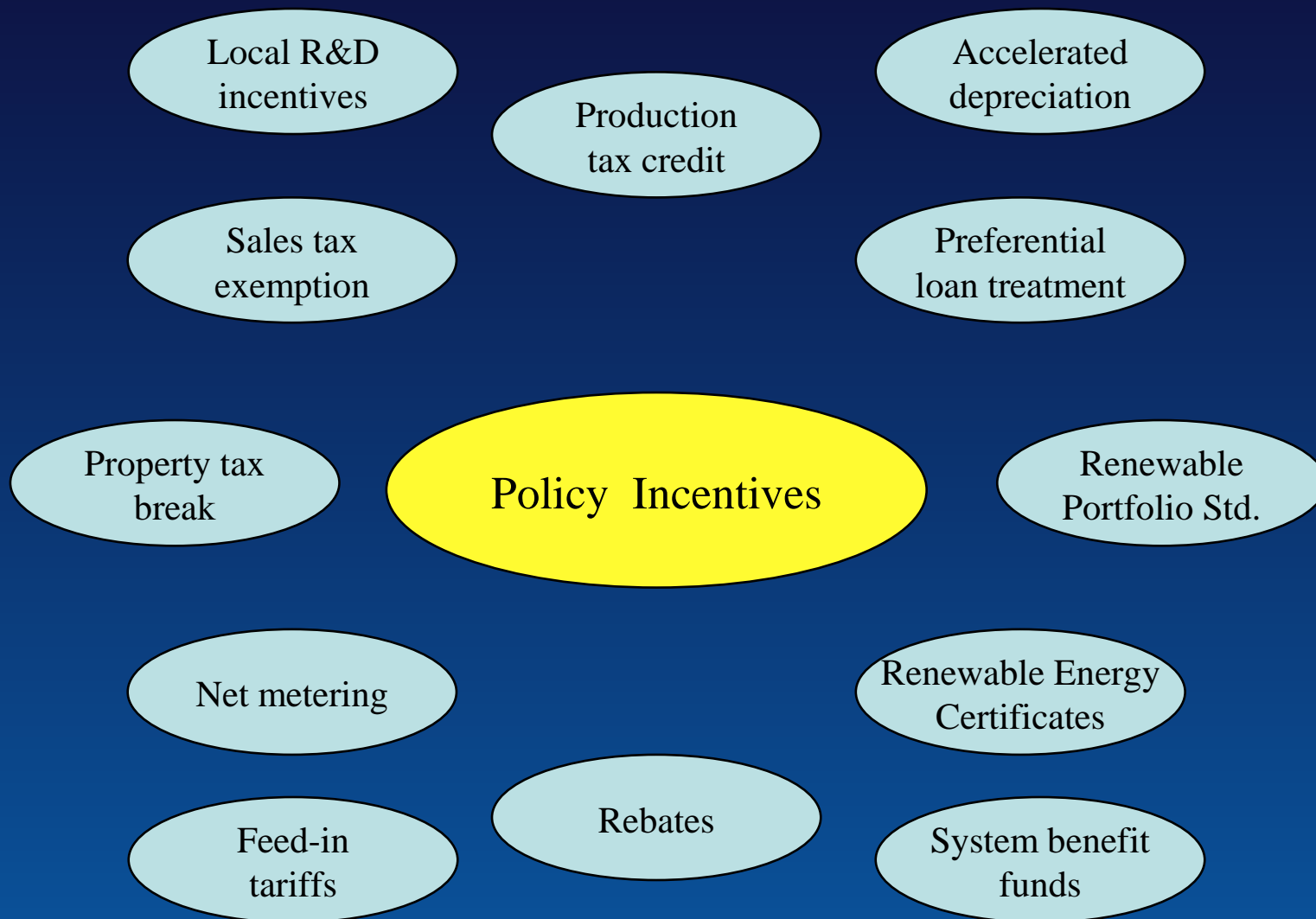
Industry	Average cost of downtime
Cellular communications	\$41,000 per hour
Telephone ticket sales	\$72,000 per hour
Airline reservations	\$90,000 per hour
Credit card operations	\$2,580,000 per hour
Brokerage operations	\$6,480,000 per hour

Source: Leiter, D. (10 May 2000) "Distributed Energy Resources." Prepared by the U.S. Department of Energy for Fuel Cell Summit IV, Washington, D.C.

Value Category: Emissions Reductions



Value Category: Direct Policy Incentives



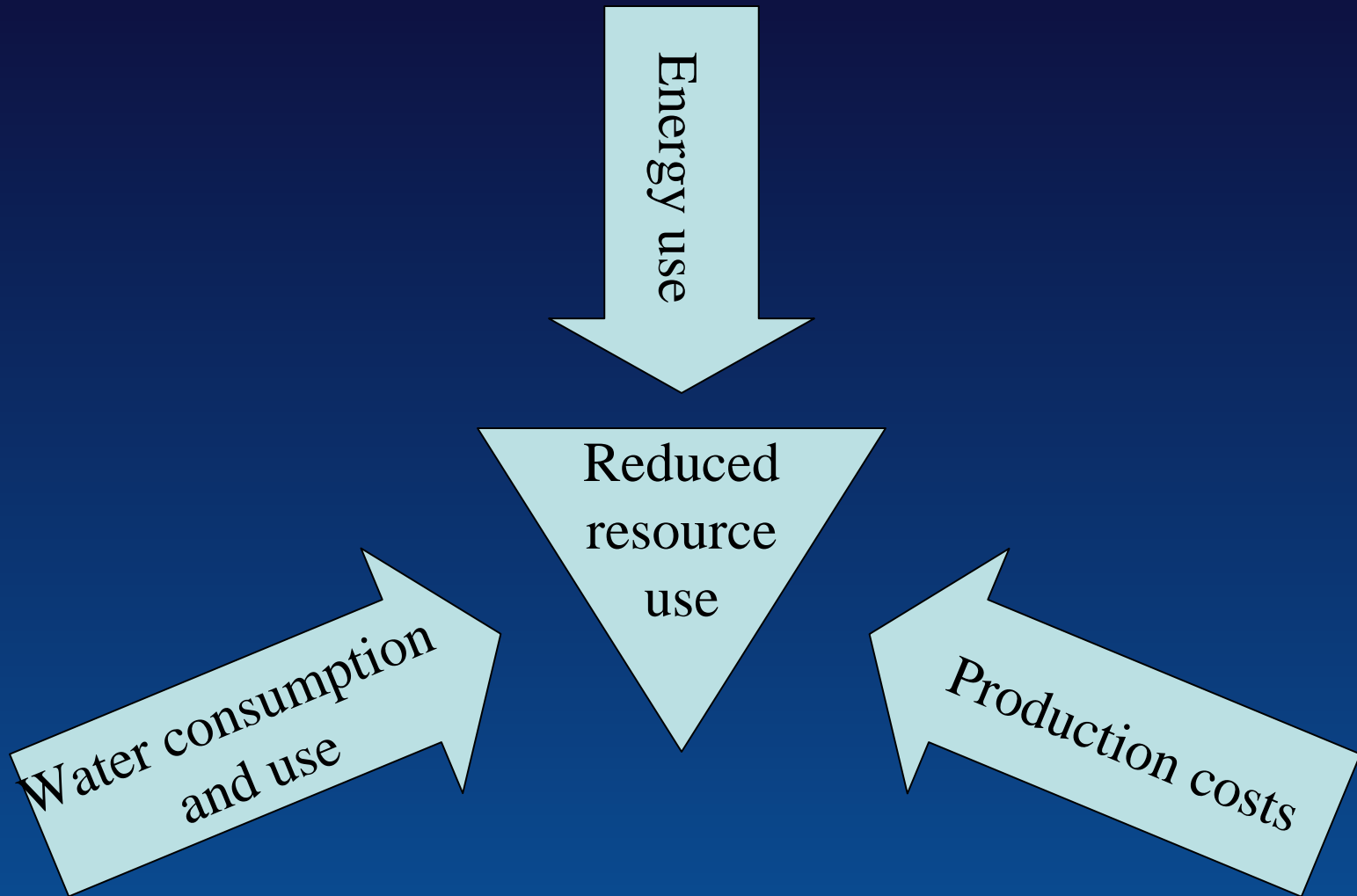
Estimated REC Market Size

(\$ millions)

	2004 REC market value	2010 REC market value
Compliance market	\$140	\$600
Voluntary market	\$15-45	\$100-300
Total	\$155-185	\$700-900

Source: Bird, L. and E. Holt. (January 2005) *Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges*. NREL Document No. NREL/TP-620-37388

Value Category: Reduced Resource Use



Value Category: Corporate Social Responsibility

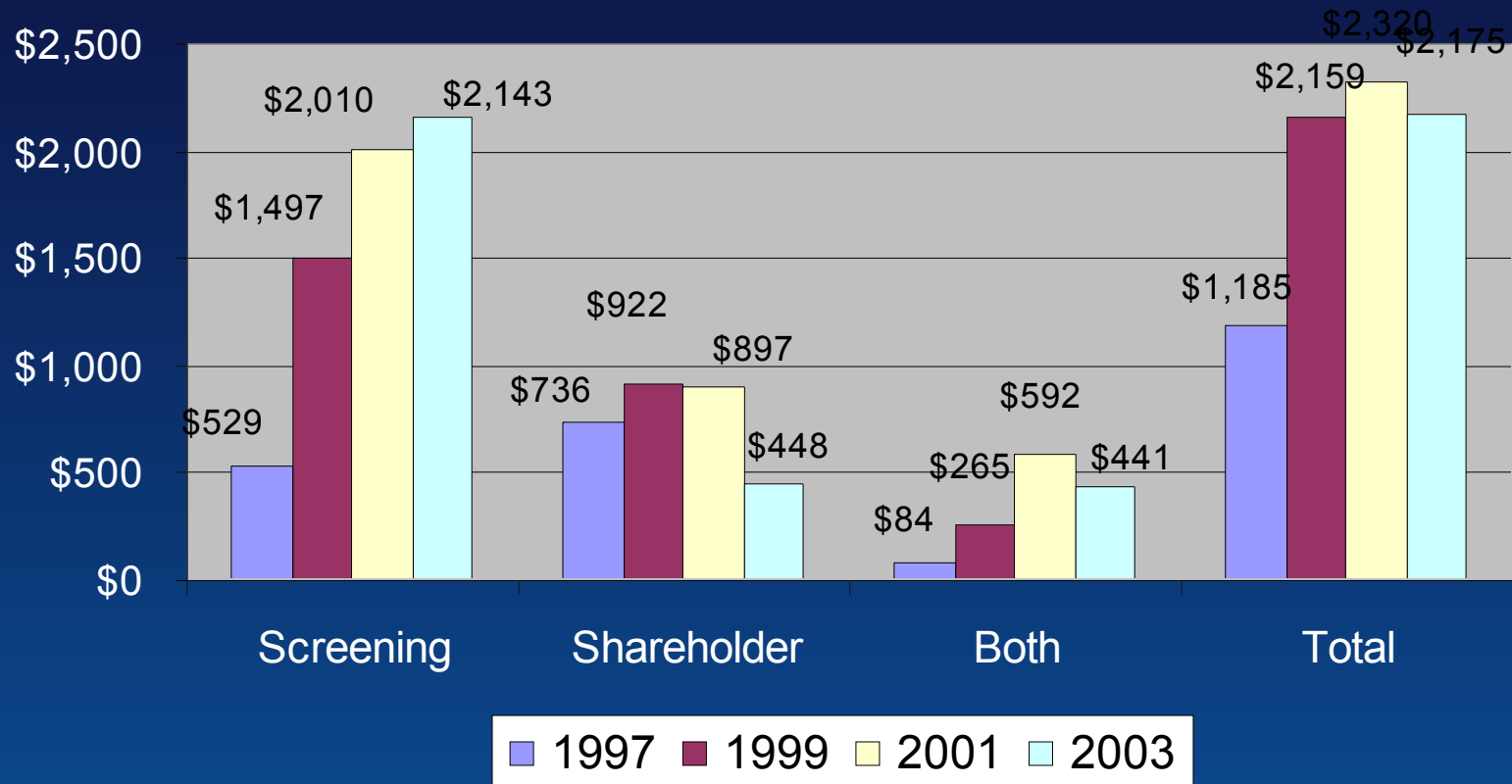
Satisfy SRI portfolio criteria



Stakeholder Relations

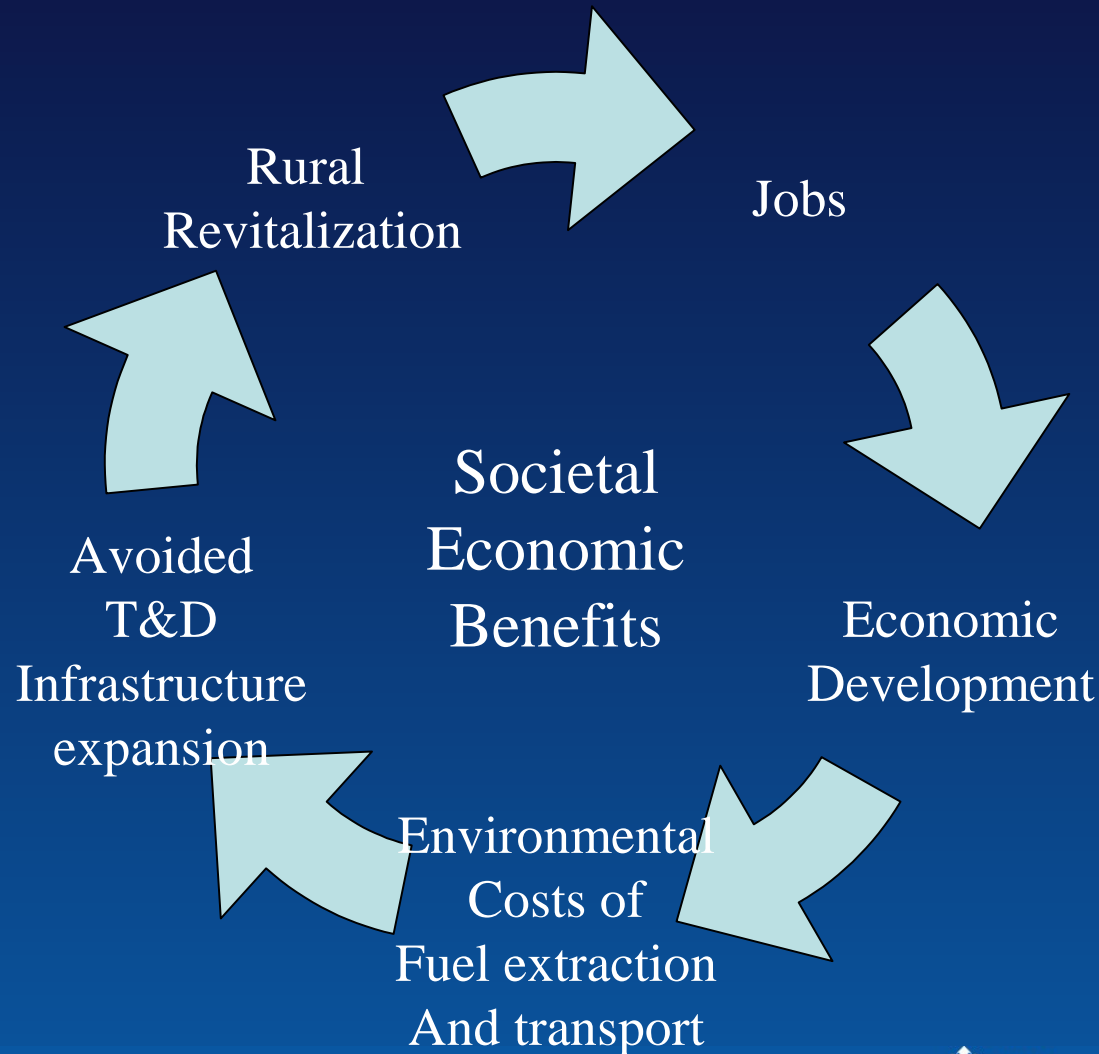
Growth of SRI Investments in U.S.

(\$ Billions) 1997-2003



Total: \$2.2 trillion in 2003

Value Category: Societal Economic Benefits

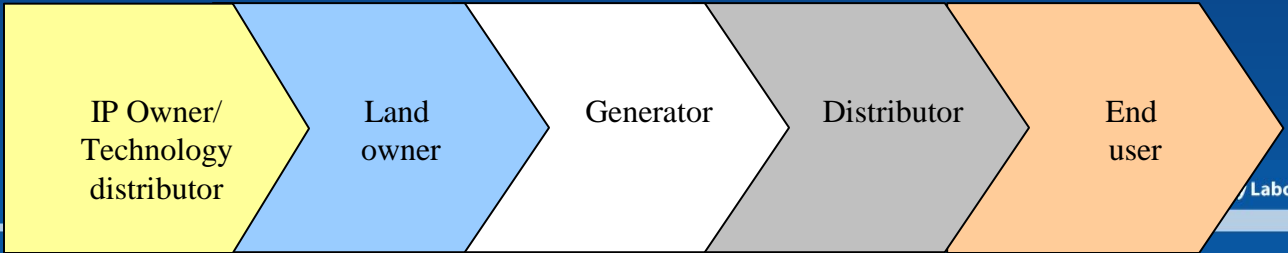


What's in it for
me?



Benefit categories	Risk Management			Hedge against fuel price volatility	
				Hedge against grid outages	
				Futures markets	
				Prepare for regulatory change	
				Reduce insurance premiums	
				Reduce cost of climate change	
				Emissions credits to trade	
	Emissions Reductions			Reduce emis. fees	Reduce emis. fees
				Avoided remediation costs	
	Direct Policy Incentives			PTC	
				Accel. depreciation	
		RPS		RPS	
				RECs	
				Feed-in tariffs	
			Prop. tax break		
				Sales tax exempt	
	Reduced Resource Use	Local R&D incentives		Reduce water use	
				Reduce energy use	
				Lower prod. costs	
	CSR			Improved relations with stakeholders	
				Help to pass through SRI investment filter	

Beneficiaries



Next Steps

- Partner with industry to perform case study on specific technology
- Development of accepted quantification methodologies
- Further validation and dissemination
 - Requires a shift in the way we think about valuation

Thank you to

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- NREL's Energy Analysis Office

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